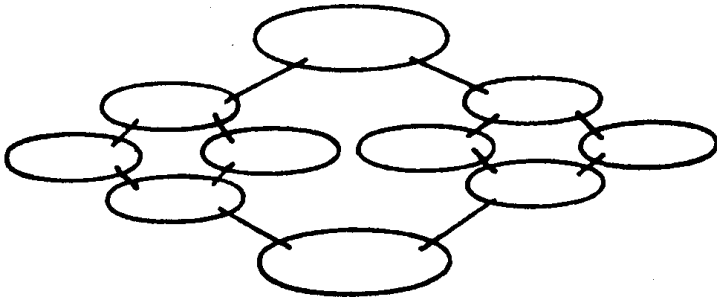
Activity Title: AQUA WORDS — Activity Guide Page #: 2

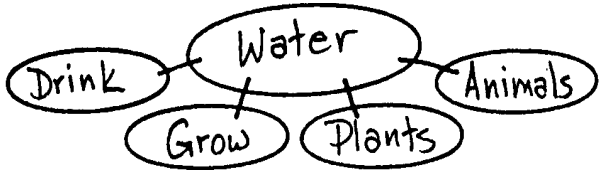
Objective(s): Students will: describe a variety of ways and reasons why water is important to people and wildlife.

Method/Overview: Students brainstorm water words, make word trees with those words and write poetic statements about water.

Subject Area(s): Language Arts, Science — Grade Level(s): K-8

Standard	**Performance Indicators (by grade clusters)**	**Evidence of alignment (text from activity description)**	**Notes to ensure high alignment for every student**
Science and Technology K. Scientific Reasoning Students will learn to formulate and justify ideas and to make informed decisions.	Elementary Grades Pre-K-2 4. Participate in brainstorming activities.	Procedure #3 Using a long strip of butcher paper or spacious empty chalkboard for recording, ask the students to list at least 100 words that have something to do with water. . .	
	Elementary Grades Pre-K-2 6. Discover relationships and patterns.	Procedure #4 Using the list of words that were recorded, ask the students to create word trees of water-related words. Begin with a simple word tree.	





Activity Title: WATER WINGS			Activity Guide Page #: 4
Objective(s): Students will: 1) illustrate the water cycle; 2) describe the interrelatedness of the world's water; and 3) state the importance of water to people, plants and animals.			
Method/Overview: Students experience a simulated field trip and then create artwork and poetry.			
Subject Area(s): Science, Art, Language Arts			Grade Level(s): 5-9
Standard	**Performance Indicators (by grade clusters)**	**Evidence of alignment (text from activity description)**	**Notes to ensure high alignment for every student**
Science and Technology B. Ecology Students will understand how living things depend on one another and on non-living aspects of the environment.	Elementary Grades 3-4 4. Investigate the connection between major living and nonliving components of a local ecosystem.	Procedure #5 Have them pay particular attention to the role of water in the lives of people, plants, and animals. Evaluation #4 List as many examples as you can of why water is important to plants and animals.	
Science and Technology L. Communication Students will communicate effectively in the application of science and technology.	Elementary Grades 3-4 4. Make and/or use sketches, tables, graphs, physical representations, and manipulatives to explain procedures and ideas.	Procedure #6 When you feel they have had enough time, ask them to open their eyes. Provide the art materials and ask them to each get paint sets and paper and to quietly paint the picture of their favorite place.	

AQUATIC WILD Links/Science

Activity Title: HOW WET IS OUR PLANET ?			Activity Guide Page #: 8
Objective(s): Students will: 1) describe the amount and distribution of water on the earth in oceans, rivers, lakes, groundwater, icecaps and the atmosphere; and 2) make inferences about the importance of responsible use of water.			
Method/Overview: Students calculate water volumes using percentages.			
Subject Area(s): Math, Science			Grade Level(s): 4-12
Standard	**Performance Indicators (by grade clusters)**	**Evidence of alignment (text from activity description)**	**Notes to ensure high alignment for every student**
Science and Technology K. Scientific Reasoning Students will learn to formulate and justify ideas and to make informed decisions.	Elementary Grades 3-4 3. Draw conclusions about observations.	Procedure #8 Consider the fragile nature of the freshwaters, wetlands and oceans of our planet. Discuss how all species depend upon this minute percentage of water for their survival. Summarize the activity by using an earth globe to illustrate that if the earth were this size (12 inches in diameter,) less than one-half cup (eight tablespoons) of water would fill all the oceans, rivers, lakes and icecaps. . . Evaluation #2 Explain why it is important that humans use water responsibly.	

AQUATIC WILD Links/Science

Activity Title: WATER PLANT ART — Activity Guide Page #: 12

Objective(s): Students will: identify a variety of aquatic plants.

Method/Overview: Students create artwork from pressed aquatic plants.

Subject Area(s): Art, Science — Grade Level(s): K-12

Standard	**Performance Indicators (by grade clusters)**	**Evidence of alignment (text from activity description)**	**Notes to ensure high alignment for every student**
Science and Technology A. Classifying Life Forms Students will understand that there are similarities within the diversity of all living things.	Elementary Grades Pre-K-2 2. Describe characteristics of different living things.	Procedure #8 Write on wax paper with waterproof pen the kind of plant and where and when it was found.	• the descriptions must be included with the art work
	Elementary Grades Pre-K-2 4. Design and describe a classification system for objects.	Procedure #6 Gently lift the plants and place on heavy, white, porous paper. Arrange the plant or parts of plants into the desired design. Procedure #8 Write on the wax paper with waterproof pen the kind of plant and where and when it was found.	• the plants should be arranged in an order based on student observation
	Elementary Grades 3-4 2. Design and describe a classification system for organisms.	Procedure #6 Gently lift the plants and place on heavy, white, porous paper. Arrange the plant or parts of plants into the desired design. Procedure #8 Write on the wax paper with waterproof pen the kind of plant and where and when it was found.	• the plants should be arranged in an order based on student observation
Science and Technology L. Communication Students will communicate effectively in the application of science and technology.	Elementary Grades 3-4 4. Make and/or use sketches, tables, graphs, physical representations, and manipulatives to explain procedures and ideas.	Procedure #6 see above Procedure #7 Cover the arrangement of plants with wax paper. Procedure #8 Write on the wax paper with waterproof pen the kind of plant and where and when it was found.	

AQUATIC WILD Links/Science

Activity Title: ARE YOU ME? Activity Guide Page #: 14

Objective(s): Students will: recognize various young stages of aquatic animals and match them with corresponding adult stages.

Method/Overview: Using picture cards, students match pairs of juvenile and adult aquatic animals.

Subject Area(s): Science Grade Level(s): K-2

Standard	**Performance Indicators (by grade clusters)**	**Evidence of alignment (text from activity description)**	**Notes to ensure high alignment for every student**
Science and Technology D. Continuity and Change Students will understand the basis for all life and that all living things change over time.	Elementary Grades Pre-K-2 3. Draw or describe ways in which an organism can change over its lifetime, sometimes in predictable ways (e.g., butterfly, frog).	Procedure #6 When the students at each table have completed their efforts to match the pairs, ask all of the groups to return to their original tables – the places they left with their own pairs of pictures. Are the matches correct? Ask the students to change any pairs that are not correctly matched . . . Procedure #9 Have all of the students look at all of the correctly matched pairs. Look at similarities and differences in how different kinds of aquatic animals grow and change. Evaluation Pick two aquatic animals. Draw a picture of each animal as an adult and another picture of each animal as it looks when it is young.	
Science and Technology K. Scientific Reasoning Students will learn to formulate and justify ideas and to make informed decisions.	Elementary Grades Pre-K-2 3. Make observations.	Procedure #5 At the new table, have the group attempt to match pairs of adult/child or student and infant photos. Procedure #7 Introduce the aquatic animal cards and divide the class in two. Designate one half of the students "adults" and the other half "young animals." . . . Procedure #9 Have all of the students look at all of the correctly matched pairs. Look at similarities and differences in how different kinds of aquatic animals grow and change.	

Activity Title: DESIGNING A HABITAT — Activity Guide Page #: 20

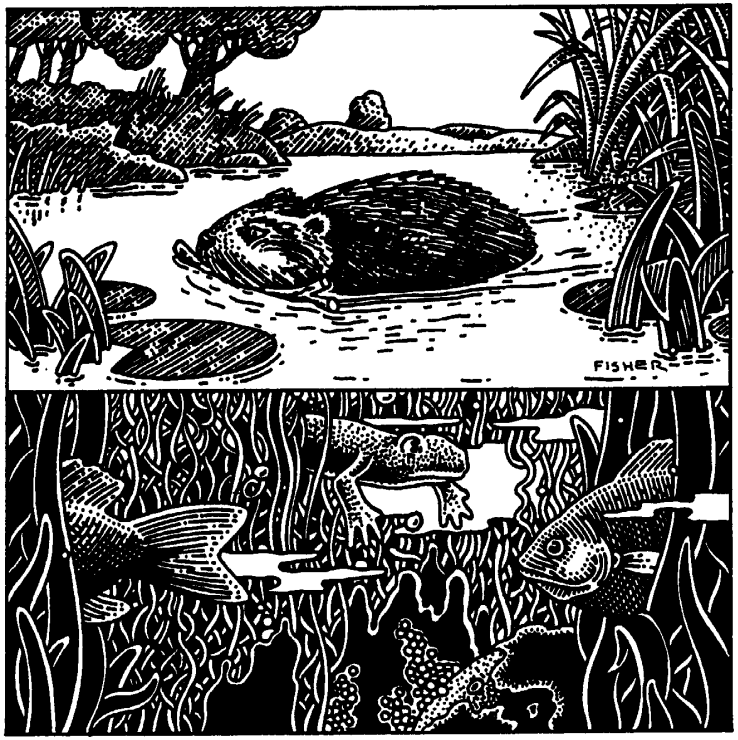
Objective(s): Students will: identify the components of habitat that are essential for most aquatic animals to survive.

Method/Overview: Students design a habitat suitable for aquatic wildlife to survive in a zoo or an aquarium.

Subject Area(s): Science, Language Arts — Grade Level(s): 4-12

Standard	**Performance Indicators (by grade clusters)**	**Evidence of alignment (text from activity description)**	**Notes to ensure high alignment for every student**
Science and Technology A. Classifying Life Forms Students will understand that there are similarities within the diversity of all living things.	Secondary Grades 3. Analyze the basic characteristics of living things, including their need for food, water, and gases and the ability to reproduce.	Procedure #7 Ask the students to summarize the components of habitat that seemed to be necessary for the survival of the aquatic animals they studied. . . Evaluation #1 List the components of suitable habitat that are necessary for most aquatic animals to survive.	
Science and Technology K. Scientific Reasoning Students will learn to formulate and justify ideas and to make informed decisions.	Middle Grades 5-8 6. Support reasoning by using a variety of evidence.	Procedure #5 Once the models are complete, ask each team to report to the rest of the class. Each report should include a description of the basic biological needs of each animal as well as a description of the characteristics of its natural habitat. . . Procedure #2 Divide the class into groups of two to four. Have each group draw one card from a container. . .	
Science and Technology L. Communication Students will communicate effectively in the application of science and technology.	Elementary Grades 3-4 4. Make and/or use sketches, tables, graphs, physical representations, and manipulatives to explain procedures and ideas.	Procedure #4 When the research is complete, each team of students is to design and build a model or small replica of a zoo exhibit or aquarium habitat which would be suitable for their animal's survival and comfort in captivity. Establish a scale for the exhibits.	
	Middle Grades 5-8 4. Make and use scale drawings, maps, and three-dimensional models to represent real objects, find locations, and describe relationships.	Procedure #4 When the research is complete, each team of students is to design and build a model or small replica of a zoo exhibit or aquarium habitat which would be suitable for their animal's survival and comfort in captivity. Establish a scale for the exhibits.	

	Middle Grades 5-8 5. Access information at remote sites using telecommunications.	<u>Procedure #3</u> Ask each group to be responsible for designing an artificial habitat in which their animal could successfully live. Inform then that each team will be expected to conduct library research or consult reference materials or resource people to determine the life requirements of each creature . . .	• allow students access to Internet
	Secondary Grades 3. Make and use appropriate symbols, pictures, diagrams, scale drawings, and models to represent and simplify real-life situations and to solve problems.	<u>Procedure #4</u> When the research is complete, each team of students is to design and build a model or small replica of a zoo exhibit or aquarium habitat which would be suitable for their animal's survival and comfort in captivity. Establish a scale for the exhibits.	



Activity Title: PUDDLE WONDERS Activity Guide Page #: 22

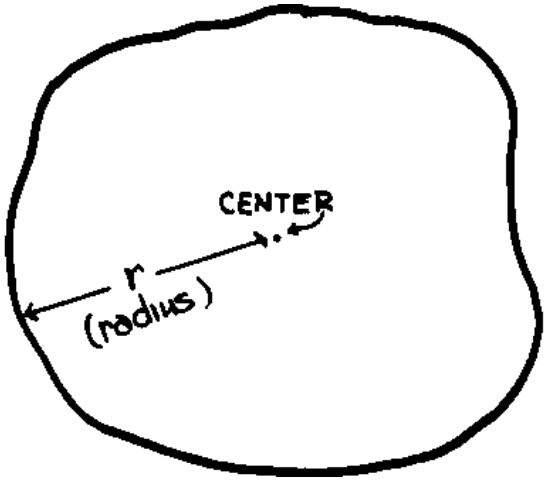
Objective(s): For younger students, Students will: 1) predict where puddles will form and how they will change: and 2) observe and describe organisms that live in or near puddles. For older students, Students will: predict where puddles will form and how they will change; 2) observe and describe organisms that live in or near puddles; 3) measure and record the amount of water in puddles: and 4) make inferences about what types of organisms occupy puddles.

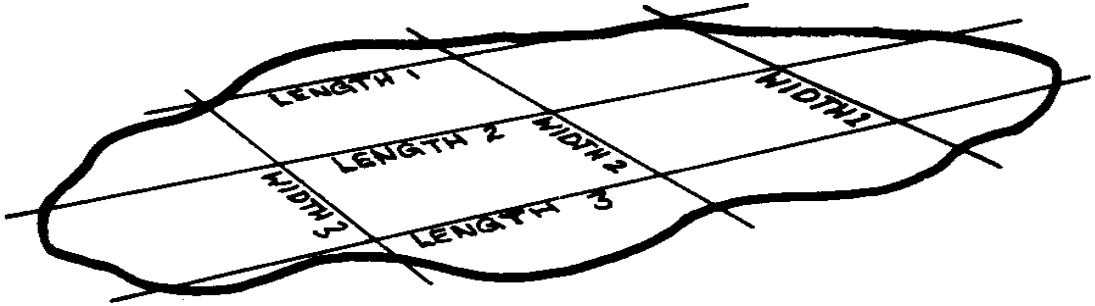
Method/Overview: Students will: observe water that accumulates in puddles on or near the school grounds as well as any associated wildlife. Older students also measure the depth, area, and volume of the puddle.

Subject Area(s): Science, Math, (for older students) Grade Level(s): 2-12

Standard	**Performance Indicators (by grade clusters)**	**Evidence of alignment (text from activity description)**	**Notes to ensure high alignment for every student**
Science and Technology B. Ecology Students will understand how living things depend on one another and on non-living aspects of the environment.	Elementary Grades Pre-K-2 1. Identify ways that organisms depend upon their environment.	Procedure #5 Ask the students what they have learned about puddles? Are they important? If yes, what is important about puddles? If no, explain why. Talk about puddles and wildlife as part of the discussion.	
Science and Technology J. Inquiry and Problem Solving Students will apply inquiry and problem-solving approaches in science and technology.	Elementary Grades Pre-K-2 1. Make accurate observations using appropriate tools and units of measure.	Procedure #2 Divide the students into small groups of three to five. Before a storm, take them to different areas of the school grounds. Have them try to guess where they think puddles will form. Have them guess what wildlife might use the puddles when the rains come . . . Procedure #3 After the next rainy period, take them outside to take an inventory of puddles on the school grounds. Were they right? Did puddles form where they had guessed they would? . . .	
	Elementary Grades 3-4 1. Make accurate observations using appropriate tools and units of measure.	Procedure #2 Procedure #3	
	Middle Grades 5-8 1. Make accurate observations using appropriate tools and units of measure.	Procedure #2 Procedure #3	
	Secondary Grades	Procedure #2	

	1. Make accurate observations using appropriate tools and units of measure.	Procedure #3	
Science and Technology K. Scientific Reasoning Students will learn to formulate and justify ideas and to make informed decisions.	Elementary Grades Pre-K-2 3. Make observations.	Procedure #2 Procedure #3	
	Elementary Grades 3-4 3. Draw conclusions about observations.	Procedure #5 Back in the classroom ask the students what they have learned about puddles? Are they important? If yes, what is important about puddles? . . .	





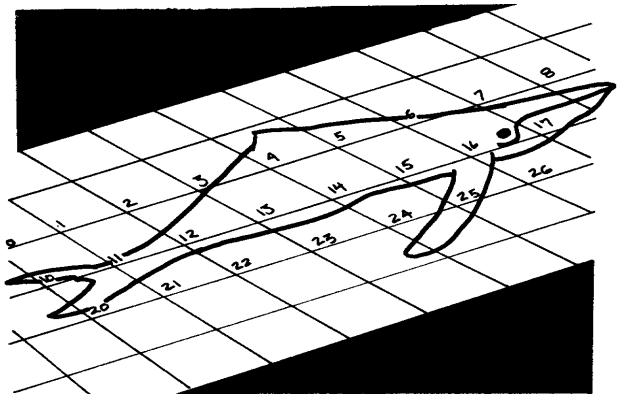
Activity Title: WHALE OF A TAIL — Activity Guide Page #: 26

Objective(s): Students will: describe the sizes of different great whales compared to their own body size.

Method/Overview: Students use computational, graphing and measuring techniques to draw or sculpture life size replicas of whales on their school grounds.

Subject Area(s): Science, Math, Language Arts — Grade Level(s): 2-8

Standard	**Performance Indicators (by grade clusters)**	**Evidence of alignment (text from activity description)**	**Notes to ensure high alignment for every student**
Science and Technology K. Scientific Reasoning Students will learn to formulate and justify ideas and to make informed decisions.	Elementary Grades Pre-K-2 6. Discover relationships and patterns.	Procedure #6 Once the size and natural history information have been compiled they should learn how to use grids to draw the whale to scale. . .	
Science and Technology L. Communication Students will communicate effectively in the application of science and technology.	Elementary Grades 3-4 4. Make and/or use sketches, tables, graphs, physical representations, and manipulatives to explain procedures and ideas.	Procedure #6 When the grid is transferred to the school ground, the whale drawing transfer can begin. It is during this transfer that having the grid squares numbered is especially helpful! . . .	
	Middle Grades 5-8 5. Access information at remote sites using telecommunications.	Procedure #2 Have the students go to reference sources to find out the sized of the whales or provide this information for them. . .	• allow students access to the Internet



AQUATIC WILD Links/Science

Activity Title: RIPARIAN RETREAT — Activity Guide Page #: 34

Objective(s): Students will: 1) describe habitat characteristics of riparian areas; 2) identify animals that inhabit them; and 3) state the importance of riparian areas to wildlife and humans.

Method/Overview: Awareness of a riparian zone is created through the use of a simulated field trip and art work.

Subject Area(s): Language Arts, Science — Grade Level(s): 6-12

Standard	**Performance Indicators (by grade clusters)**	**Evidence of alignment (text from activity description)**	**Notes to ensure high alignment for every student**
Science and Technology L. Communication Students will communicate effectively in the application of science and technology.	Elementary Grades 3-4 4. Make and/or use sketches, tables, graphs, physical representations, and manipulatives to explain procedures and ideas.	Procedure #4 Ask them to describe their favorite images. Once each student has done this, invite all of the students to select art materials. Each should draw or paint his or her images on the paper provided. Once they are finished, have the students tape up their art work on a display area.	
	Secondary Grades 3. Make and use appropriate symbols, pictures, diagrams, scale drawings, and models to represent and simplify real-life situations and to solve problems.	Procedure #4 Ask them to describe their favorite images. Once each student has done this, invite all of the students to select art materials. Each should draw or paint his or her images on the paper provided. Once they are finished, have the students tape up their art work on a display area.	

Activity Title: WATER CANARIES Activity Guide Page #: 38

Objective(s): Students will: 1) identify several aquatic organisms; and 2) assess the relative environmental quality of a stream or pond based on indicators of pH, water temperature and the presence of a diversity of organisms.

Method/Overview: Students investigate a stream or pond using sampling techniques.

Subject Area(s): Science Grade Level(s): 4-12

Standard	**Performance Indicators (by grade clusters)**	**Evidence of alignment (text from activity description)**	**Notes to ensure high alignment for every student**
Science and Technology A. Classifying Life Forms Students will understand that there are similarities within the diversity of all living things.	Elementary Grades 3-4 3. Describe the different living things within a given habitat.	Procedure #3 Start by observing the water. Look for organisms on the surface and in the depths. Using the sampling equipment (nets, trays, assorted containers, etc.), have the students collect as many different forms of animal life as possible. . .	
Science and Technology B. Ecology Students will understand how living things depend on one another and on non-living aspects of the environment.	Elementary Grades 3-4 4. Investigate the connection between major living and nonliving components of a local ecosystem.	Procedure #6 Now it is time to test the water at the field site for other indicators of quality using the water quality kit. Have the students determine the pH and the temperature of the water, as well as the air temperature. . . Procedure #7 Help the students understand that the values for pH, water and air temperature affect the diversity of life forms found in aquatic environments. . . Evaluation #2 You found a trout in a stream long with a large variety of other organisms. Predict ranges you would expect to find for: pH, water temperature.	
	Middle Grades 5-8 2. Analyze how the finite resources in an ecosystem limit the types and populations of organisms within it.	Procedure #6 Procedure #7 Procedure #9 Summarize the study with a re-emphasis that the diversity of specific animals is a useful indicator of habitat quality as well as an overall indicator of environmental quality.	
Science and Technology J. Inquiry and Problem Solving Students will apply inquiry and problem-solving approaches in science and technology.	Elementary Grades 3-4 1. Make accurate observations using appropriate tools and units of measure.	Procedure #3 Procedure #6	
	Middle Grades 5-8	Procedure #3	

	1. Make accurate observations using appropriate tools and units of measure.	Procedure #6	
	Secondary Grades 1. Make accurate observations using appropriate tools and units of measure.	Procedure #3 Procedure #6	
Science and Technology K. Scientific Reasoning Students will learn to formulate and justify ideas and to make informed decisions.	Elementary Grades 3-4 3. Draw conclusions about observations.	Procedure #7 Evaluation #2 You found a trout in a stream long with a large variety of other organisms. Predict ranges you would expect to find for: pH, water temperature.	
	Secondary Grades 3. Develop generalizations based on observations.	Procedure #7 Evaluation #2 You found a trout in a stream long with a large variety of other organisms. Predict rangers you would expect to find for: pH, water temperature.	
Science and Technology L. Communication Students will communicate effectively in the application of science and technology.	Elementary Grades 3-4 4. Make and/or use sketches, tables, graphs, physical representations, and manipulatives to explain procedures and ideas.	Procedure #3 Procedure #4 Have the students identify and draw the animals on Worksheet 1 – those observed in their natural setting and those temporarily removed for observation in the collection containers. . . Evaluation #1 Draw a simple illustration of one or more of the following organisms: asellus (water sowbug), bass, caddisfly larva, carp, cyclops, daphnia, leech, mayfly nymph, midge larva, stonefly nymph. Write the correct name beside the picture.	

AQUATIC WILD Links/Science

Activity Title: KELP HELP — Activity Guide Page #: 48

Objective(s): Students will: list and describe different ways that kelp can be beneficial to humans, wildlife and the environment.

Method/Overview: Students research kelp, create a mural and report to the class about their findings.

Subject Area(s): Science, Language Arts — Grade Level(s): 6-8

Standard	**Performance Indicators (by grade clusters)**	**Evidence of alignment (text from activity description)**	**Notes to ensure high alignment for every student**
Science and Technology B. Ecology Students will understand how living things depend on one another and on non-living aspects of the environment.	Elementary Grades 3-4 1. Describe a food web and the relationships within a given ecosystem.	<u>Extension #2</u> Draw an accurate portrayal of a kelp "forest" food web. Keep the animals and plants to their proportionate sizes in the drawings.	
Science and Technology L. Communication Students will communicate effectively in the application of science and technology.	Elementary Grades 3-4 4. Make and/or use sketches, tables, graphs, physical representations, and manipulatives to explain procedures and ideas.	<u>Procedure #2</u> Once the research is finished, have each group visually summarize its findings on a large sheet of paper.	
	Middle Grades 5-8 5. Access information at remote sites using telecommunications.	<u>Procedure #1</u> Assign (or have the students choose) topics such as the following to research related to kelp: algin, kelp as a habitat for wildlife, kelp as a food source (kelp recipes), emulsifiers, medicinal uses of kelp, aquatic weeds of the world (both marine and freshwater), the Sargasso Sea, algae and the oceanic food chain, sea otters, sea urchins	• allow students time to research using the Internet

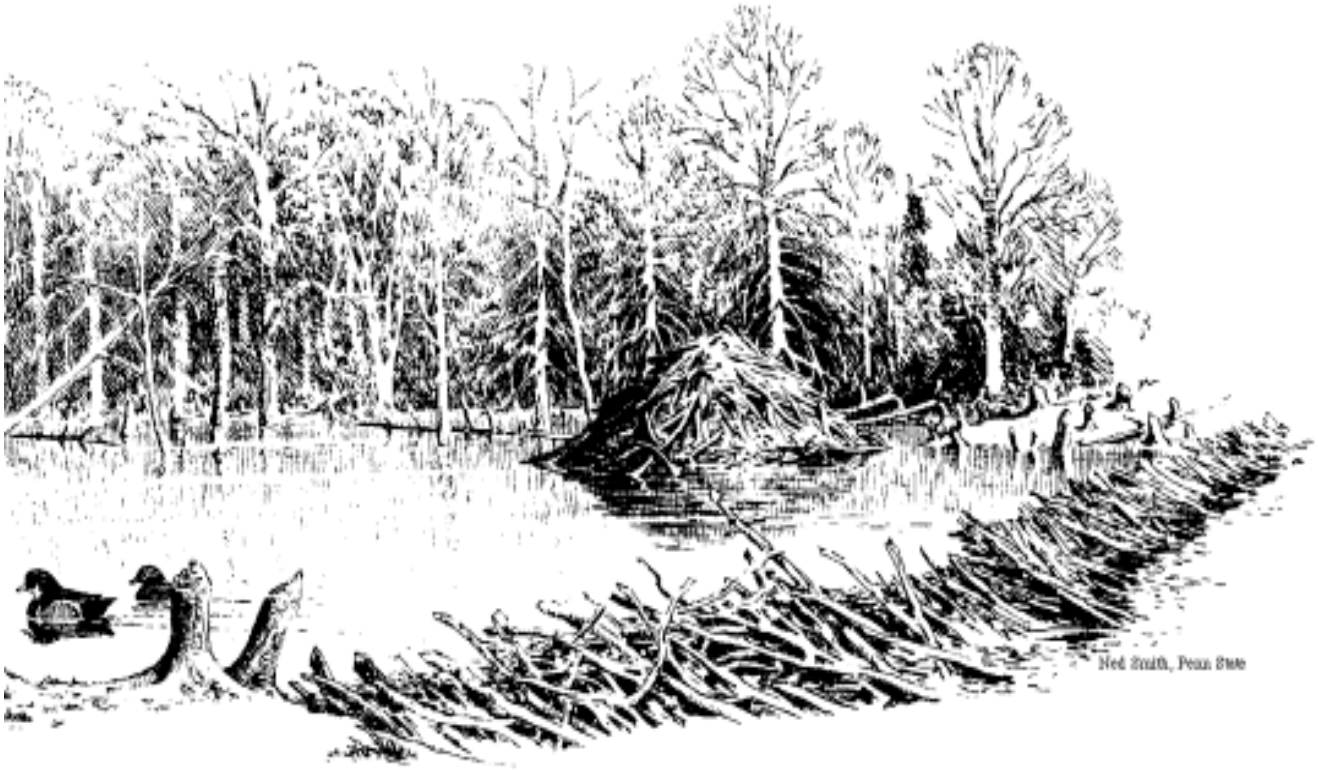
Activity Title: WETLAND METAPHORS — Activity Guide Page #: 54

Objective(s): Students will: 1) describe the characteristics of wetlands; and 2) demonstrate their understanding of the importance of wetlands to wildlife and humans.

Method/Overview: Students are presented with a selection of "hands-on" objects for investigation as metaphors for natural functions of wetlands.

Subject Area(s): Science, Language Arts — Grade Level(s): 1-12

Standard	**Performance Indicators (by grade clusters)**	**Evidence of alignment (text from activity description)**	**Notes to assure high alignment for every student**
Science and Technology K. Scientific Reasoning Students will learn to formulate and justify ideas and to make informed decisions.	Elementary Grades Pre-K-2 4. Participate in brainstorming activities.	Procedure #3 Invite the students to tell what they imagined. Compile a list of their offerings. Encourage discussion and mutual sharing.	• the activity itself could be used as an assessment tool after a field trip to a wetland habitat



Activity Title: MARSH MUNCHERS Activity Guide Page #: 58

Objective(s): Students will: identify a food web in a salt marsh.

Method/Overview: Students will use body movement and pantomime to simulate the feeding motions of marsh animals and identify their interconnectedness in a food web.

Subject Area(s): Science Grade Level(s): 3-6

Standard	**Performance Indicators (by grade clusters)**	**Evidence of alignment (text from activity description)**	**Notes to assure high alignment for every student**
Science and Technology A. Classifying Life Forms Students will understand that there are similarities within the diversity of all living things.	Elementary Grades 3-4 3. Describe the different living things within a given habitat.	Procedure #11 Discuss the results. Did every predator fill up by getting 10 food tokens during the tidal cycle? If not, why not? (Some animals are more selective in their feeding preferences and therefore may have a more difficult time finding food.) . . . Evaluation #1 Give examples of two predators and two prey species that live in salt marshes. Evaluation #2 Use some of the organisms listed below, and others of your choice, to construct a food web that might be found in a salt marsh. . .	
Science and Technology B. Ecology Students will understand how living things depend on one another and on non-living aspects of the environment.	Elementary Grades 3-4 1. Describe a food web and the relationships within a given ecosystem.	Procedure #12 Draw a food web based on what feeding interactions took place during the game. . . Evaluation #2 Use some of the organisms listed below, and others of your choice, to construct a food web that might be found in a salt marsh . . .	
	Elementary Grades 3-4 2. Explain the difference between producers (e.g., green plants), consumers (e.g., those that eat green plants), and decomposers (e.g., bacteria that break down the "consumers" when they die), and identify examples of each.	Procedure #2 Describe the salt marsh habitat in terms of the plants and animals that live there. Also discuss the importance of salt marshes with emphasis on their high productivity as a place for animals and plants to live. Describe the role of detritus in the marsh food web. Mention decomposers and their importance. . . Procedure #11 Evaluation #1 Give examples of two predators and two prey species that live in salt marshes.	
	Middle Grades 5-8	Evaluation #1	

	4. Generate examples of the variety of ways that organisms interact (e.g., competition, predator/prey, parasitism/mutualism).	Give examples of two predators and two prey species that live in salt marshes.	

This rubric focuses on the content addressed in the science and technology, classifying life forms, elementary grades, #3, performance indicator. Students must describe the living things within a marsh ecosystem.

4	Students *exceed* the standard if they construct an accurate food web, correctly identifying the predators and prey of more than four species found in a marsh habitat. Students must also identify food for the prey.
3	Students *meet* the standard if they identify 2 predator and 2 prey species that live in a salt marsh and correctly link them in a food web.
2	Students *partially meet* the standard if they identify at least one predator and prey animal found in a salt marsh.
1	Students do not meet the standard if they can not identify an organism found in a salt marsh.

Activity Title: MICRO ODYSSEY — Activity Guide Page #: 64

Objective(s): Students will: 1) identify forms of microscopic life that live in water: and 2) describe the interrelatedness of various aquatic plants and animals.

Method/Overview: Students will examine, draw, paint and identify microorganisms in pond water.

Subject Area(s): Science, Art — Grade Level(s): 4-12

Standard	**Performance Indicators (by grade clusters)**	**Evidence of alignment (text from activity description)**	**Notes to assure high alignment for every student**
Science and Technology A. Classifying Life Forms Students will understand that there are similarities within the diversity of all living things.	Elementary Grades 3-4 3. Describe the different living things within a given habitat.	Procedure #2 Invite the students to remove about a tablespoon of the pond water from the container. Remember to tell them to get the water from within the container and not just at the surface. Have them examine the water with hand lenses and microscopes. . . Evaluation #1 Draw a simple illustration of one or more to the following organisms: daphina, euglena, hydra, spirogyra, rotifer, water mite. . . Evaluation #2 Identify each of the organisms in the list above, plus sulfur bacteria, as a producer (P), consumer (C), and decomposer (D).	
Science and Technology B. Ecology Students will understand how living things depend on one another and on non-living aspects of the environment.	Elementary Grades 3-4 1. Describe a food web and the relationships within a given ecosystem.	Evaluation #3 Use at least three of the organisms listed above and others, to construct an aquatic food web that might be found in a pond.	
	Elementary Grades 3-4 3. Compare and contrast physical and living components of different biomes - i.e., regions characterized by their climate and plant life - (e.g., tundra, rain forest, ocean, desert).	Procedure #4 Create a class mural of the pond and its aquatic environment. The paintings done in procedure 3 should be added to the mural at appropriate locations. . . Evaluation #2 Identify each of the organisms in the list above, plus sulfur bacteria, as a producer (P), consumer (C), and decomposer (D).	
Science and Technology C. Cells Students will understand that cells are the basic units of life.	Elementary Grades 3-4 3. Explore how the use of a microscope allows one to see cells in a variety of organisms.	Procedure #2	
Science and Technology	Elementary Grades 3-4	Procedure #2	

J. Inquiry and Problem Solving Students will apply inquiry and problem-solving approaches in science and technology.	1. Make accurate observations using appropriate tools and units of measure.		
	Middle Grades 5-8 1. Make accurate observations using appropriate tools and units of measure.	Procedure #2	
	Secondary Grades 1. Make accurate observations using appropriate tools and units of measure.	Procedure #2	
Science and Technology K. Scientific Reasoning Students will learn to formulate and justify ideas and to make informed decisions.	Elementary Grades 3-4 3. Draw conclusions about observations.	Procedure #2 Do some seem to be predators? Which of the other life forms do the predators prey upon?	
Science and Technology L. Communication Students will communicate effectively in the application of science and technology.	Elementary Grades 3-4 4. Make and/or use sketches, tables, graphs, physical representations, and manipulatives to explain procedures and ideas.	Procedure #2	

Activity Title: BLUE RIBBON NICHE — Activity Guide Page #: 72

Objective(s): Students will: 1) identify different organisms that live in riparian ecosystems; 2) describe the ecological role of some organisms in riparian habitats; 3) describe some basic characteristics of riparian habitats; and 4) evaluate potential positive and negative effects from changes in riparian habitats.

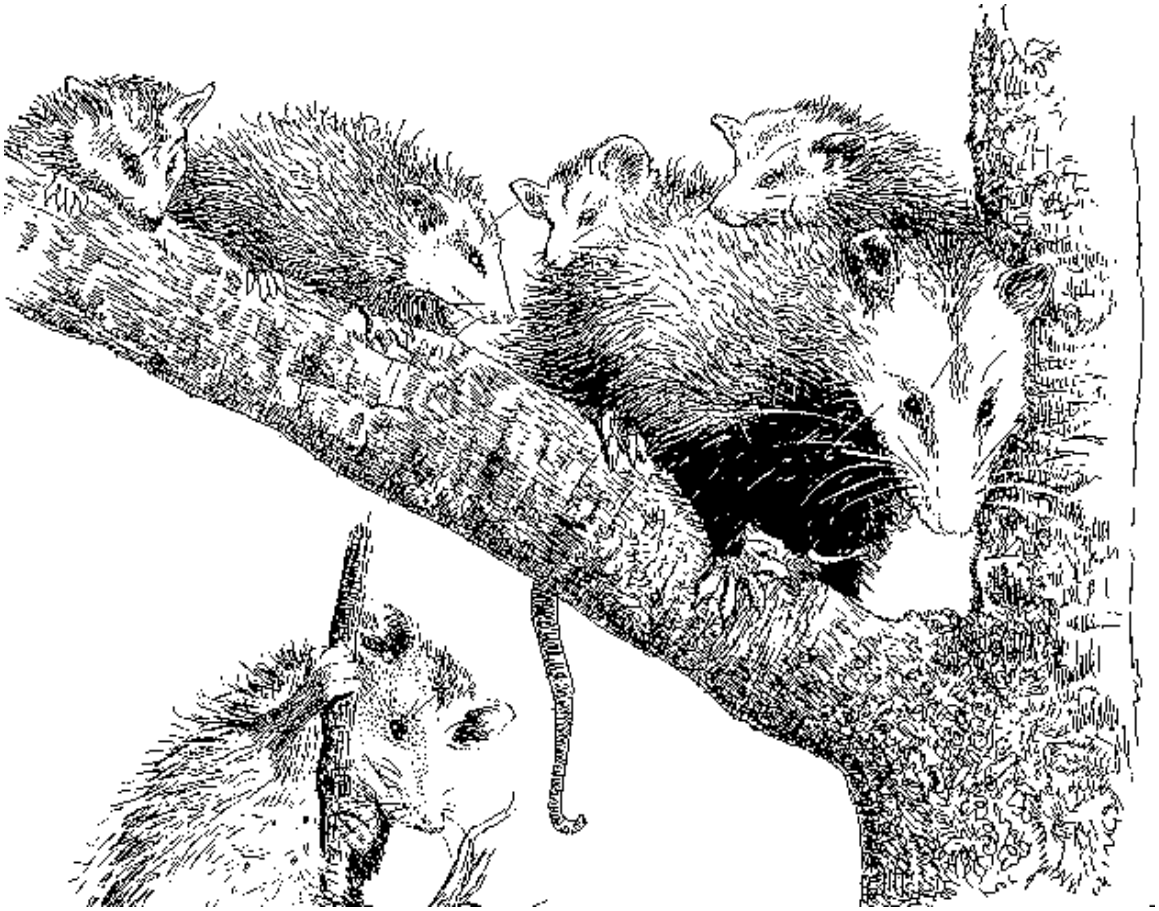
Method/Overview: Students create a variety of representations of animals that live in riparian habitats.

Subject Area(s): Science, Language Arts — Grade Level(s): 5-12

Standard	**Performance Indicators (by grade clusters)**	**Evidence of alignment (text from activity description)**	**Notes to assure high alignment for every student**
Science and Technology A. Classifying Life Forms Students will understand that there are similarities within the diversity of all living things.	Elementary Grades 3-4 3. Describe the different living things within a given habitat.	Procedure #1 Select a local stream or standing body of water with which the students may have some familiarity. Tell the students that dozens of different animals and plants live in, around, above and below that aquatic habitat. . . Procedure #3 Once the list is verified have the students each choose an organism. Ask each student to create an art form representation of their animal. . . Procedure #4 The students should become familiar with how the organism they have chosen "makes a living." That is, they should know its "occupation" in the habitat – its niche. . .	
Science and Technology B. Ecology Students will understand how living things depend on one another and on non-living aspects of the environment.	Elementary Grades 3-4 1. Describe a food web and the relationships within a given ecosystem.	Procedure #4 Evaluation #1 Identify and describe the habitat and niche of each of these organisms: raccoon, frog, fish, heron, mosquito. Evaluation #2 Name three other animals that are common in riparian ecosystems in your area. What is the niche of each?	
	Elementary Grades 3-4 2. Explain the difference between producers (e.g., green plants), consumers (e.g., those that eat green plants), and decomposers (e.g., bacteria that break down the "consumers" when they die), and identify examples of each.	Procedure #4 Optional: Add terms such as predator, prey, consumer, producer, decomposer, herbivore, carnivore, omnivore, food web.	
	Middle Grades 5-8	Procedure #4	

	4. Generate examples of the variety of ways that organisms interact (e.g., competition, predator/prey, parasitism/mutualism).		
	Secondary Grades 4. Analyze the impact of human and other activities on the type and pace of change in ecosystems.	Procedure #4 Evaluation #4 A large stand of trees in a riparian area is being evaluated for its economic potential. What other values would you ask the owners to consider before making a decision whether or not to cut the trees? Explain.	
Science and Technology L. Communication Students will communicate effectively in the application of science and technology.	Elementary Grades 3-4 4. Make and/or use sketches, tables, graphs, physical representations, and manipulatives to explain procedures and ideas.	Procedure #3 Once the list is verified have the students each choose an organism Ask each student to create an art form representation of their animal. They can use drawing, painting, collage, sculpture, magazine images, or any other art form of their choice. Be sure to ask the students to make their work durable enough to be displayed out-of-doors. Each art form should have a hook, string or support to allow it to be hung on branches, stuck in the soil or placed on a solid surface.	
Science and Technology M. Implications of Science and Technology Students will understand the historical, social, economic, environmental, and ethical implications of science and technology.	Elementary Grades 3-4 4. Explain practices for conservation in daily life, based on a recognition that renewable and non-renewable resources have limits.	Procedure #9 Now ask the students to consider things that might change this riparian zone so as to affect how suitable the habitat would be for the animals living there. Evaluation #4 A large stand of trees in a riparian area is being evaluated for its economic potential. What other values would you ask the owners to consider before making a decision whether or not to cut the trees? Explain.	
	Middle Grades 5-8 4. Describe an individual's biological and other impacts on an environmental system.	Procedure #9 Now ask the students to consider things that might change this riparian zone so as to affect how suitable the habitat would be for the animals living there. Evaluation #4 A large stand of trees in a riparian area is being evaluated for its economic potential. What other values would you ask the owners to consider before making a decision whether or not to cut the trees? Explain.	
	Secondary Grades 2. Demonstrate the importance of	Procedure #9 Now ask the students to consider things that might change	

	resource management, controlling environmental impacts, and maintaining natural ecosystems.	this riparian zone so as to affect how suitable the habitat would be for the animals living there. Evaluation #4 A large stand of trees in a riparian area is being evaluated for its economic potential. What other values would you ask the owners to consider before making a decision whether or not to cut the trees? Explain.	



Activity Title: HOOKS AND LADDERS — Activity Guide Page #: 76

Objective(s): Students will: 1) recognize that some fish migrate as part of their life cycle; 2) identify the stages of the life cycle of one kind of fish; 3) describe limiting factors affecting Pacific salmon as they complete the their life cycle; and 4) generalize that limiting factors affect all populations of animals.

Method/Overview: Students simulate Pacific salmon and the hazards faced by salmon in an activity portraying the life cycle of these aquatic creatures.

Subject Area(s): Social Studies, Geography, Math, Science — Grade Level(s): 3-9

Standard	**Performance Indicators (by grade clusters)**	**Evidence of alignment (text from activity description)**	**Notes to assure high alignment for every student**
Science and Technology A. Classifying Life Forms Students will understand that there are similarities within the diversity of all living things.	Elementary Grades Pre-K-2 3. Explain, draw, or otherwise demonstrate the life cycle of an organism.	Procedure # 3 Begin the activity with all the salmon in the spawning ground. The salmon first move into the reservoir above the dam. They must stay in the reservoir while they count to 30. This simulates the disorientation that salmon face due to a lack of current in the lake to direct them on their journey. . . Procedure #4 Once past the turbines, the salmon must get past some predatory wildlife. . . Procedure #5 Once in the open ocean, the salmon can be caught by fishing boats. The salmon must move back and forth across the ocean area in order to gather four tokens. . . Procedure #6 Once four of the year tokens are gathered, the salmon can begin upstream. . . Procedure #7 Once through the ladder, the salmon faces the broad jump waterfall. The waterfall represents of the natural barriers the salmon must face going upstream. . . Procedure #8 Above the falls, the two predators who started the simulation as the predators below the turbines are now the last set of limiting factors faced by the salmon. . . Procedure #9 The activity ends when all the salmon are gone before the spawning ground is reached – or when all surviving salmon reach the spawning ground.	• this activity is designed for older students but the information could be modified for younger groups
	Elementary Grades 3-4	Extension #1	

	4. Compare and contrast the life cycles, behavior, and structure of different organisms.	Write a report on the life history of one of the species of salmon . . . Extension #2 Research and illustrate the life cycle of any local fish. If possible, look for one that migrates. Evaluation #1 List, describe, and illustrate the major stages in a Pacific salmon's life cycle.	
Science and Technology B. Ecology Students will understand how living things depend on one another and on non-living aspects of the environment.	Secondary Grades 3. Analyze the factors that affect population size (e.g., reproductive and survival rates).	Procedure #10 Engage the students in a discussion. Explore topics such as: the apparent survival-mortality ratio of salmon, the students' feelings throughout the activity, the role of the barriers, the role of the predatory wildlife and the people fishing, where the losses were greatest, where the losses were least, what the consequences would be if all the eggs deposited made the journey successfully, what seemed realistic about this simulation and what did not. Evaluation #2 Identify and describe some of the factors that affect salmon as they complete their life cycle. Evaluation #3 Identify and describe some limiting factors that might affect other animal populations.	
Science and Technology L. Communication Students will communicate effectively in the application of science and technology.	Secondary Grades 5. Critique models, stating how they do and do not effectively represent the real phenomenon.	Procedure #10 What seemed realistic about this simulation and what did not?	

AQUATIC WILD Links/Science

Activity Title: WHERE DOES WATER RUN OFF AFTER SCHOOL?			Activity Guide Page #: 82
Objective(s): Students will: describe relationships between precipitation, runoff and aquatic habitats.			
Method/Overview: Students measure and calculate the area of the schoolground; calculate the volume and weight of water falling on the school ground; determine specific and annual rainfall and runoff; and trace the course of that water to aquatic habitats.			
Subject Area(s): Math, Science			Grade Level(s): 6-12
Standard	**Performance Indicators (by grade clusters)**	**Evidence of alignment (text from activity description)**	**Notes to assure high alignment for every student**
Science and Technology J. Inquiry and Problem Solving Students will apply inquiry and problem-solving approaches in science and technology.	Middle Grades 5-8 1. Make accurate observations using appropriate tools and units of measure.	Procedure #1 In this activity, students will find out how much rain falls on their school ground – and how much it weighs! . . . Procedure #2 Once the area of the school grounds has been established, the next step is to determine the amount of rain that falls in the area. . . Procedure #3 With the depth of rainfall determined, and the area of the school ground measured, the next step is to calculate the volume of rainfall. Procedure #4 Knowing the volume, the students can now calculate the weight of the rain.	
Science and Technology M. Implications of Science and Technology Students will understand the historical, social, economic, environmental, and ethical implications of science and technology.	Middle Grades 5-8 4. Describe an individual's biological and other impacts on an environmental system.	Evaluation #2 Name two human activities that have affected the quality of runoff. Evaluation #6 Write an advertising campaign slogan to convey the importance of runoff to wildlife. Include the need for clean water without toxins. Evaluation #7 Write a short list of steps to take for wildlife to protect the quality of runoff water.	

	Secondary Grades 2. Demonstrate the importance of resource management, controlling environmental impacts, and maintaining natural ecosystems.	Evaluation #6 Write an advertising campaign slogan to convey the importance of runoff to wildlife. Include the need for clean water without toxins. Evaluation #7 Write a short list of steps to take for wildlife to protect the quality of runoff water.	

AQUATIC WILD Links/Science

Activity Title: FISHY WHO'S WHO			Activity Guide Page #: 86
Objective(s): Students will: 1) recognize and identify the major species of freshwater or saltwater fish that live in their area; 2) describe various values of fish species in some aquatic ecosystems; and 3) locate places where the fish species occur.			
Method/Overview: Students do an inventory of fish habitats that exist in their area, obtain information about the various fish species that occur in these habitats, and locate the fish species on a map according to where they occur.			
Subject Area(s): Science, Language Arts			Grade Level(s): 4-12
Standard	**Performance Indicators (by grade clusters)**	**Evidence of alignment (text from activity description)**	**Notes to assure high alignment for every student**
Science and Technology L. Communication Students will communicate effectively in the application of science and technology.	Elementary Grades 3-4 4. Make and/or use sketches, tables, graphs, physical representations, and manipulatives to explain procedures and ideas.	<u>Procedure #4</u> Ask each team to create a set of paintings, sketches, or other illustrations of the fish they have written about in their biographies as well as an illustration of the habitat in which the fish is found. These should be drawn large enough to be seen easily in a wall display.	
	Middle Grades 5-8 5. Access information at remote sites using telecommunications.	<u>Procedure #3</u> Divide the class into teams. Have each team identify possible sources of information about fish and fish habitats in the community, state, or region . . .	• allow students time to use the Internet for research

Activity Title: FASHION A FISH — Activity Guide Page #: 88

Objective(s): For Younger Students: Students will classify fish according to body shape and coloration. For Older Students: Students will: 1) describe adaptations of fish to their environments: 2) describe how adaptations can help fish survive in their habitat: and 3) interpret the importance of adaptations in animals.

Method/Overview: Students design a variety of fish adapted for various aquatic habitats.

Subject Area(s): Science, Art — Grade Level(s): K-12

Standard	**Performance Indicators (by grade clusters)**	**Evidence of alignment (text from activity description)**	**Notes to assure high alignment for every student**
Science and Technology 2. Classifying Life Forms Students will understand that there are similarities within the diversity of all living things.	Elementary Grades Pre-K-2 2. Describe characteristics of different living things.	Extension #2 Look at examples of actual fish. Describe the fish's "lifestyle" and speculate on its habitat by examining its coloration, body shape and mouth. Extension #1 Take an adaptation card from any category and find real fish with that adaptation!	• allow each student to answer questions
	Middle Grades 5-8 3. Describe some structural and behavioral adaptations that allow organisms to survive in a changing environment.	Procedure #1 Assign students to find a picture or make a drawing of a kind of animal that has a special adaptation – for example, long necks on giraffes for reaching high vegetation to eat, . . . Evaluation #1 Name two fish adaptations in each of the following categories: mouth, shape, coloration, reproduction. . .	• allow each student to answer questions
Science and Technology K. Scientific Reasoning Students will learn to formulate and justify ideas and to make informed decisions.	Elementary Grades Pre-K-2 6. Discover relationships and patterns.	Evaluation Circle the fish with vertical stripes, the one that can best hide behind plants. Circle the fish with the horizontal, flat shape. Circle the fish that would be difficult to see from above.	• allow students to answer questions individually
	Elementary Grades 3-4 3. Draw conclusions about observations.	Procedure #2 Conduct a class discussion on the value of different kinds of adaptations to animals. . . Extension #2 Look at examples of actual fish. Describe the fish's "lifestyle" and speculate on its habitat by examining its coloration, body shape and mouth.	

Activity Title: MIGRATION HEADACHE — Activity Guide Page #: 94

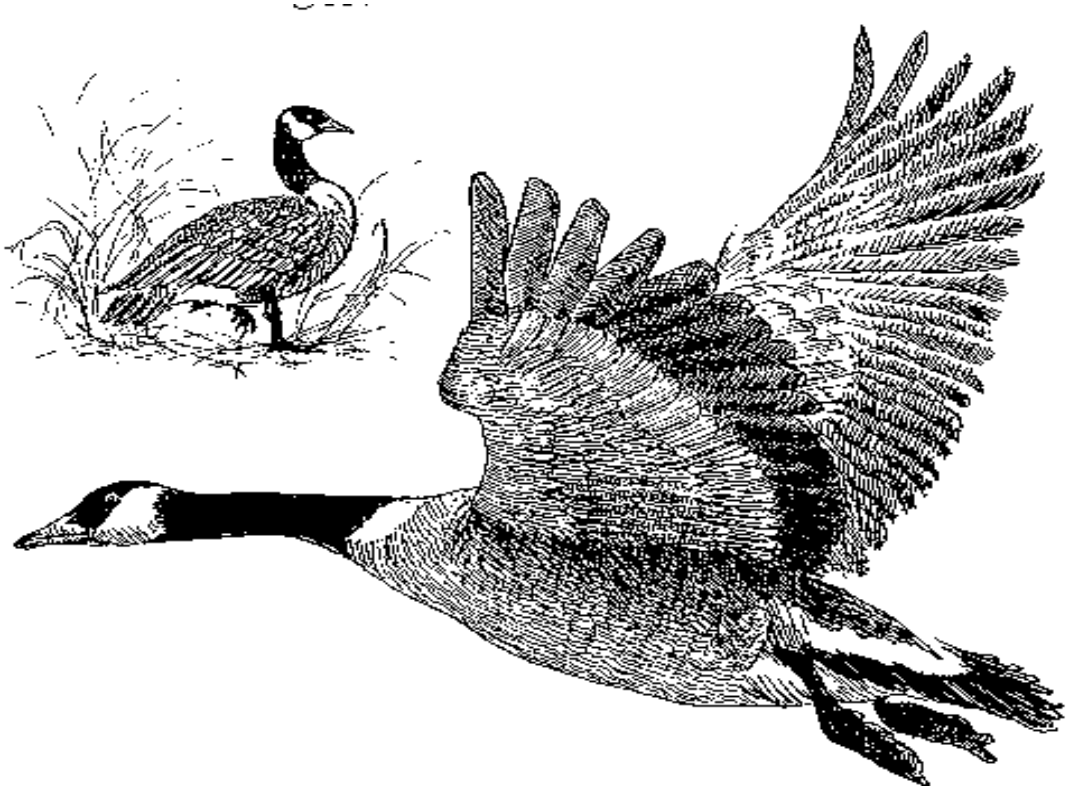
Objective(s): Students will: 1) list limiting factors affecting population of migrating water birds; 2) predict the effects of such limiting factors; 3) describe the effects of habitat loss and degradation on populations of migrating water birds; and 4) make inferences about the importance of suitable habitat for migrating water birds.

Method/Overview: Students role play migrating water birds traveling between nesting habitats and wintering grounds and are subject to hazards at either end of the migration path as well as along the way.

Subject Area(s): Science, Language Arts, Math, Science, Social Studies, Physical Education — Grade Level(s): 4-12

Standard	**Performance Indicators (by grade clusters)**	**Evidence of alignment (text from activity description)**	**Notes to assure high alignment for every student**
Science and Technology B. Ecology Students will understand how living things depend on one another and on non-living aspects of the environment.	Secondary Grades 4. Analyze the impact of human and other activities on the type and pace of change in ecosystems.	Procedure #9 In discussion, ask the student to identify the apparent causes of the birds' population decline from year to year. Ask them to try to imagine what seem to be the major factors contributing to habitat loss and degradation. . . Procedure #10 List and discuss human-caused factors and environmental factors. Compare similarities and differences between these limiting factors. . . Evaluation #1 Name two human activities and two environmental factors that might interfere with water bird migration. . .	• allow each student to answer questions
Science and Technology K. Scientific Reasoning Students will learn to formulate and justify ideas and to make informed decisions.	Middle Grades 5-8 6. Support reasoning by using a variety of evidence.	Procedure #9 Ask the students to support their hypotheses with evidence, seeking additional information through research, if necessary.	• allow each student to answer question
Science and Technology	Secondary Grades	Evaluation #1	• allow each student to answer

M. Implications of Science and Technology Students will understand the historical, social, economic, environmental, and ethical implications of science and technology.	2. Demonstrate the importance of resource management, controlling environmental impacts, and maintaining natural ecosystems.	Evaluation #3 Why is suitable habitat important for migrating water birds? Include in your response a description of the different kinds of habitat that are needed by migrating water birds. Extension #3 Procedure #9 In discussion, ask the student to identify the apparent causes of the birds' population decline from year to year. Ask them to try to imagine what seem to be the major factors contributing to habitat loss and degradation . . .	question



AQUATIC WILD Links/Science

Activity Title: AQUATIC ROOTS — Activity Guide Page #: 100

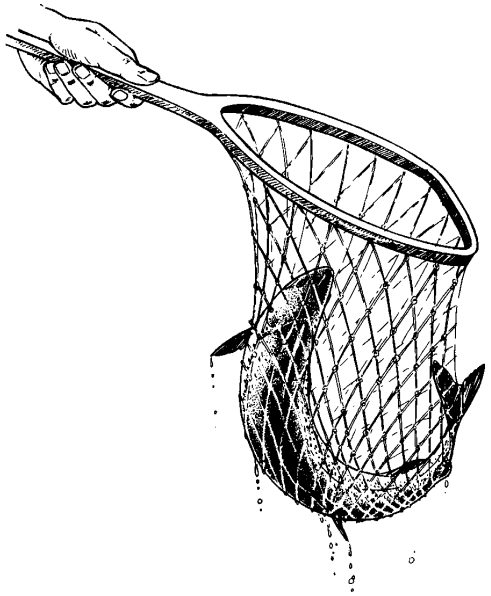
Objective(s): Students will: 1) trace the origins of various species of local aquatic animals and/or aquatic plants; 2) categorize them into native and exotic species; and 3) evaluate the appropriateness of introducing new species.

Method/Overview: Students use reference materials to research various local aquatic plants, and/or animals to find out whether they are native or exotics and to investigate their impacts on people, other animals, and the environment.

Subject Area(s): Science, Social Studies — Grade Level(s): 5-12

Standard	**Performance Indicators (by grade clusters)**	**Evidence of alignment (text from activity description)**	**Notes to assure high alignment for every student**
Science and Technology K. Scientific Reasoning Students will learn to formulate and justify ideas and to make informed decisions.	Secondary Grades 6. Analyze situations where more than one logical conclusion can be drawn.	Procedure #4 They could create a two-column list of benefits and liabilities. In addition to simply listing benefits and liabilities, they should assess the importance of each item in the columns. Benefits and liabilities – positive and negative effects – may not have equal value. . . Evaluation #3 A local organization has proposed that a new fish be introduced into your state's rivers or lakes. List at least five questions that should be answered about the fish before the proposal is approved or rejected.	• require each student to create this list on their own and discuss it • allow students to answer questions individually
Science and Technology L. Communication Students will communicate effectively in the application of science and technology.	Middle Grades 5-8 5. Access information at remote sites using telecommunications.	Procedure #4 Students to do library research about one particular species known to be "introduced" as an exotic to the area or state. . .	• allow students time to use Internet resources
Science and Technology M. Implications of Science and Technology Students will understand the historical, social, economic, environmental, and ethical implications of science and technology.	Middle Grades 5-8 6. Give examples of actions which may have expected or unexpected consequences that may be positive, negative, or both.	Procedure #4	• require students to create this list on their own and discuss it

Activity Title: NET GAIN, NET EFFECT			Activity Guide Page #: 104
Objective(s): Students will: 1) describe the evolution of fishing from the techniques of early humans to contemporary times: and 2) interpret the possible effects of changes in technology on fish populations.			
Method/Overview: Students conduct a simulation to explore the evolution of fishing and the effects of changing technology on fish populations.			
Subject Area(s): Science, Math			Grade Level(s): 3-6
Standard	**Performance Indicators (by grade clusters)**	**Evidence of alignment (text from activity description)**	**Notes to assure high alignment for every student**
Science and Technology L. Communication Students will communicate effectively in the application of science and technology.	Elementary Grades Pre-K-2 5. Make and read simple graphs.	Procedure #13 Optional: work with the students to construct a bar graph to show them the numbers of fish they conduct using the different nets and different techniques of netting.	• each student should make a graph



Activity Title: WHERE HAVE ALL THE SALMON GONE? Activity Guide Page #: 110

Objective(s): Students will: 1) interpret and make inferences about fluctuations in fish populations from actual data; and 2) analyze the effects of human use and habitat changes on a fish population.

Method/Overview: Students graph and interpret actual fish population data in relation to historical events.

Subject Area(s): Science, Math Grade Level(s): 6-12

Standard	**Performance Indicators (by grade clusters)**	**Evidence of alignment (text from activity description)**	**Notes to assure high alignment for every student**
Science and Technology B. Ecology Students will understand how living things depend on one another and on non-living aspects of the environment.	Secondary Grades 4. Analyze the impact of human and other activities on the type and pace of change in ecosystems.	Procedure #3 Provide the students with historical background. Have them review this new information in relation to what their graphs show. . .	• discuss effect of human activity on the ecosystem
Science and Technology J. Inquiry and Problem Solving Students will apply inquiry and problem-solving approaches in science and technology.	Secondary Grades 2. Verify, evaluate, and use results in a purposeful way. This includes analyzing and interpreting data, making predictions based on observed patterns, testing solutions against the original problem conditions, and formulating additional questions.	Procedure #2 Ask the students to list and explain whatever inferences they can draw from the data provided. Do the graphs show any long-term trends? Are there periods where the rates of fish caught change rapidly in a short time? What inferences about population abundance of each species can be made from the graphs and fish information? . . .	• allow each student to answer questions individually
Science and Technology K. Scientific Reasoning Students will learn to formulate and justify ideas and to make informed decisions.	Elementary Grades 3-4 3. Draw conclusions about observations.	Procedure #2	• allow each student to answer questions individually
	Middle Grades 5-8 8. Construct logical arguments.	Extension #2 Write a short "scientific" paper explaining the data, analysis and interpretations of the fish population. Read your paper to the class, and defend your analysis.	• allow each student to answer questions individually
	Secondary Grades 6. Analyze situations where more than one logical conclusion can be drawn.	Procedure #2 Are there different interpretations that individual students make from the same information? Do each of the interpretations seem to explain or fit the information and data? If faced with making a management decision based on one of the interpretations, how would you decide which interpretation to use?	• allow each student to answer questions individually

AQUATIC WILD Links/Science

Science and Technology L. Communication Students will communicate effectively in the application of science and technology.	Secondary Grades 8. Engage in a debate, on a scientific issue, where both points of view are based on the same set of information.	<u>Procedure #2</u> <u>Extension #2</u> Write a short "scientific" paper explaining the data, analysis and interpretations of the fish population. Read your paper to the class, and defend your analysis.	• allow time for students to debate their points of view

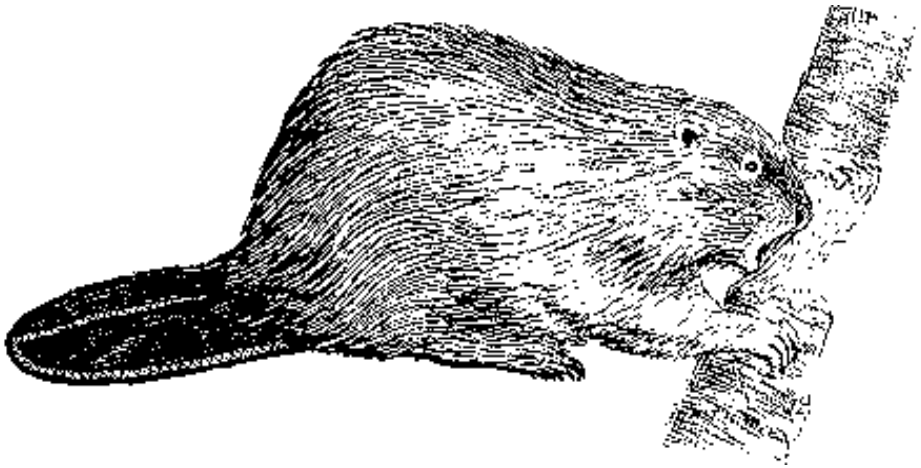
Activity Title: WATERED DOWN HISTORY — Activity Guide Page #: 116

Objective(s): Students will: 1) describe human, plant and animal life associated with a waterway from ancient times to the present: 2) predict the future of the waterway; and 3) analyze cause and effect relationships between events and consequences affecting the waterway.

Method/Overview: Students investigate the history of a chosen waterway through standard reference sources as well as taped personal interviews and public records, where available, and then display their findings on a mural.

Subject Area(s): Social Studies (History, Geography) — Grade Level(s): 4-8

Standard	**Performance Indicators (by grade clusters)**	**Evidence of alignment (text from activity description)**	**Notes to assure high alignment for every student**
Science and Technology K. Scientific Reasoning Students will learn to formulate and justify ideas and to make informed decisions.	Middle Grades 5-8 8. Construct logical arguments.	Evaluation #2 You are an elected official. Smith represents a group in favor of building a dam on a river to produce irrigation water and recreation opportunities in your area. . .	• allow each student to support their point of view either orally or in writing
Science and Technology L. Communication Students will communicate effectively in the application of science and technology.	Middle Grades 5-8 5. Access information at remote sites using telecommunications.	Procedure #4 Ask students to identify resources. Procedure #6 Encourage diversity in their research methods.	• allow each student time to use computers for Internet research



AQUATIC WILD Links/Science

Activity Title: WATER WE EATING? Activity Guide Page #: 120

Objective(s): Students will: 1) identify foods derived from aquatic sources and their geographic origins; and 2) describe the importance of aquatic environments as food sources.

Method/Overview: Students visit a local supermarket or grocery store and compile a list of products that originate in aquatic habitats.

Subject Area(s): Social Studies, Science, Health Grade Level(s): K-12

Standard	**Performance Indicators (by grade clusters)**	**Evidence of alignment (text from activity description)**	**Notes to assure high alignment for every student**
Science and Technology K. Scientific Reasoning Students will learn to formulate and justify ideas and to make informed decisions.	Elementary Grades Pre-K-2 4. Participate in brainstorming activities.	Procedure #1 Ask the students to make a list of all the things that they would expect to find in a supermarket or grocery that come directly from aquatic environments. They may need help with what constitutes an aquatic environment.. . .	• allow each student to participate in brainstorming activity
	Elementary Grades 3-4 7. Function effectively in groups within various assigned roles (e.g., reader, recorder).	Procedure #2 Where possible, identify the product, its uses and its source of origin. . .	• allow each student to work as each role in the group
Science and Technology L. Communication Students will communicate effectively in the application of science and technology.	Middle Grades 5-8 6. Identify and perform roles necessary to accomplish group tasks.	Procedure #2	

Activity Title: AQUATIC TIMES			Activity Guide Page #: 126
Objective(s): Students will: 1) identify a diversity of issues related to aquatic organisms and habitats; and 2) develop their own opinions concerning some issues involving aquatic life and habitats.			
Method/Overview: Students will investigate, write and produce a newspaper that features aquatic information and issues.			
Subject Area(s): Language Arts			Grade Level(s): 1-12
Standards	**Performance Indicators (by grade clusters)**	**Evidence of alignment (text from activity description)**	**Notes to assure high alignment for every student**
Science and Technology L. Communication Students will communicate effectively in the application of science and technology.	Middle Grades 5-8 5. Access information at remote sites using telecommunications.	Procedure #2 Begin the research phase, asking the students to gather information and ideas for their chosen section. Tell them that whatever they compile has to relate to aquatic animals and plants, aquatic habitats, or aquatic-related issues. . .	• allow each student time to do research on the Internet

AQUATIC WILD Links/Science

Activity Title: THE GLASS MENAGERIE			Activity Guide Page #: 130
Objective(s): Students will: describe the characteristics of oligotrophic and eutrophic aquatic habitats, emphasizing the effects of nutrient loading.			
Method/Overview: Students observe and describe changes in physical characteristics of several different experimental aquatic habitats that they create.			
Subject Area(s): Science			Grade Level(s): 7-12
Standards	**Performance Indicators (by grade clusters)**	**Evidence of alignment (text from activity description)**	**Notes to assure high alignment for every student**
Science and Technology B. Ecology Students will understand how living things depend on one another and on non-living aspects of the environment.	Secondary Grades 4. Analyze the impact of human and other activities on the type and pace of change in ecosystems.	Procedure #9 Emphasize the role and impact of accelerated growth due to introduced nutrient loads. Discuss natural sources of nutrients and human-related sources. Compare the similarities and differences. . .	• allow each student to answer the questions individually
Science and Technology L. Communication Students will communicate effectively in the application of science and technology.	Middle Grades 5-8 1. Discuss scientific and technological ideas and make conjectures and convincing arguments.	Procedure #4 This will be the beginning of a four-week period of observation. Procedure #5 Have the students record their observations, including drawing or illustrations of the various life forms that they find. . .	• check each students' observations to make sure their technique is appropriate
	Secondary Grades 1. Analyze research or other literature for accuracy in the design and findings of experiments.	Procedure #4 This will be the beginning of a four-week period of observation. Procedure #5	

AQUATIC WILD Links/Science

Activity Title: TO DAM OR NOT TO DAM			Activity Guide Page #: 134
Objective(s): Students will: evaluate potential positive and negative effects from constructing a dam on a river.			
Method/Overview: Students role play individuals representing differing perspectives and concerns related to a complex issue.			
Subject Area(s): Social Studies, Science			Grade Level(s): 4-12
Standards	**Performance Indicators (by grade clusters)**	**Evidence of alignment (text from activity description)**	**Notes to assure high alignment for every student**
Science and Technology B. Ecology Students will understand how living things depend on one another and on non-living aspects of the environment.	Secondary Grades 4. Analyze the impact of human and other activities on the type and pace of change in ecosystems.	Procedure #6 Following the council's decision, have a brief class discussion of summarize the "pros" and "cons" that emerges from the students' presentations. Identify and list the benefits, if any, and costs or liabilities, if any, as a result of building the dam. . . Extension #2 Find out if there are any proposals to created new dams or any other proposals that will affect wildlife habitat in your region . . .	• each student should participate in the discussion and answer the questions
Science and Technology K. Scientific Reasoning Students will learn to formulate and justify ideas and to make informed decisions.	Middle Grades 5-8 8. Construct logical arguments.	Procedure #3 Ask students to prepare for their role, developing a short position paper for use as background for the dramatization of their role. Procedure #4 Arrange the classroom to represent a meeting room for the county council in the area in which the town of Rocksburg is located. Students will role-play their position and make a presentation to the five-member Rocksburg County Council. . . Extension #1 Change roles and conduct the council meeting again. . .	• allow each student to construct their own argument
Science and Technology L. Communication Students will communicate effectively in the application of science and technology.	Secondary Grades 8. Engage in a debate, on a scientific issue, where both points of view are based on the same set of information.	Procedure #3 Procedure #4	• all students should participate in the role-play session and class discussion
Science and Technology	Middle Grades 5-8	Procedure #6	

M. Implications of Science and Technology Students will understand the historical, social, economic, environmental, and ethical implications of science and technology.	4. Describe an individual's biological and other impacts on an environmental system.	Extension #2 Find out if there are any proposals to create new dams or any other proposals that will affect wildlife habitat in your region . . .	

Activity Title: FACTS AND FALSEHOODS — Activity Guide Page #: 138

Objective(s): Students will: 1) develop criteria for evaluating the quality, balance and fairness of an informational presentation; and 2) evaluate the balance and fairness of informational presentations designed to represent points of view about an environmental topic.

Method/Overview: Students analyze and evaluate print material according to criteria they establish for quality, balance, and fairness; then develop their own informational presentations using such criteria.

Subject Area(s): Language Arts, Social Studies, Science — Grade Level(s): 7-12

Standards	**Performance Indicators (by grade clusters)**	**Evidence of alignment (text from activity description)**	**Notes to assure high alignment for every student**
Science and Technology K. Scientific Reasoning Students will learn to formulate and justify ideas and to make informed decisions.	Middle Grades 5-8 4. Analyze means of slanting information.	Procedure #3 Divide the class into pairs or teams. Give each group an article from the tabloid and a student assignment sheet listing the questions. Ask the students to review the article or item and to answer the questions on the sheet. . . Procedure #4 Next distribute the samples of informational brochures, handouts, or pamphlets that were collected and are related to aquatic and other environmental topics. . . Procedure #7 Ask the students whether or not it is possible to be forceful and effective in expressing one's view without becoming unfair or biased. . .	• each student should participate in the discussions and answer the questions

Activity Title: DEADLY SKIES Activity Guide Page #: 142

Objective(s): Students will: 1) describe acid rain; 2) describe the effects of acid rain on plant life; 3) generate and test hypotheses concerning effects of acid precipitation; and 4) make inferences about the potential effects of acid precipitation on aquatic life.

Method/Overview: Through simulations and direct measurement, the students experience differing conditions of acidity in aquatic habitats and explore the consequences of acidic conditions on aquatic life.

Subject Area(s): Science, Social Studies Grade Level(s): 1-12

Standards	**Performance Indicators (by grade clusters)**	**Evidence of alignment (text from activity description)**	**Notes to assure high alignment for every student**
Science and Technology J. Inquiry and Problem Solving Students will apply inquiry and problem-solving approaches in science and technology.	Elementary Grades Pre-K-2 1. Make accurate observations using appropriate tools and units of measure.	Procedure #6 Ask the students to keep an observation chart for each tray, describing the general condition of the plants each day. . .	• each student should record their own observations; make the observation requirement appropriate for grade level
	Elementary Grades 3-4 1. Make accurate observations using appropriate tools and units of measure.	Procedure #6	• see above
	Middle Grades 5-8 1. Make accurate observations using appropriate tools and units of measure.	Procedure #6	• see above
	Secondary Grades 1. Make accurate observations using appropriate tools and units of measure.	Procedure #6	• see above
Science and Technology K. Scientific Reasoning Students will learn to formulate and justify ideas and to make informed decisions.	Elementary Grades Pre-K-2 3. Make observations.	Procedure #6	• allow each student to make observation
	Middle Grades 5-8 3. Identify basic informal fallacies in arguments.	Procedure #7 Ask the students to summarize what they have learned about the effects of this simulated "acid precipitation" on plant growth and health. . . Evaluation What is acid rain? What causes acid rain? What could acid rain do to these things: water, plants, fish, buildings, soil, people? . . .	• each student should answer questions individually

	Secondary Grades 3. Develop generalizations based on observations.	Procedure #7 Ask the students to summarize what they have learned about the effects of this simulated "acid precipitation" on plant growth and health. . . Evaluation #3 Predict what happens over time to each of the following as a result of acid precipitation: plants, fish, soil, cars, buildings, aquatic insects, aquatic birds and mammals, aquatic habitats, humans.	• each student should answer questions individually

Activity Title: DRAGONFLY POND — Activity Guide Page #: 154

Objective(s): Students will: 1) evaluate the effects of different kinds of land use on wetland habitats; and 2) discuss and evaluate lifestyle changes to minimize damaging effects on wetlands.

Method/Overview: Students create a collage of human land-use activities around an image of a pond.

Subject Area(s): Science, Social Studies — Grade Level(s): 4-12

Standards	**Performance Indicators (by grade clusters)**	**Evidence of alignment (text from activity description)**	**Notes to assure high alignment for every student**
Science and Technology K. Scientific Reasoning Students will learn to formulate and justify ideas and to make informed decisions.	Elementary Grades 3-4 6. Practice and apply simple logic, intuitive thinking, and brainstorming.	Procedure #10 Ask students to brainstorm possible problems that could be faced within each of these aquatic systems as a result of the human activities at Dragonfly Pond. . . Procedure #12 Ask the students to create a list of things they think they personally can do to begin to reduce the potentially damaging effects of their own lifestyles on the "downstream' habitats they may never have thought about. . . Evaluation #1 Name three things that people can do to reduce or prevent damage to wetlands. . . Evaluation#2 Under what conditions, if any, do you think actions to reduce damage to wetlands would be inappropriate? . . .	• each student should answer the questions
Science and Technology L. Communication Students will communicate effectively in the application of science and technology.	Middle Grades 5-8 2. Defend problem-solving strategies and solutions.	Procedure #6 Encourage discussion of their choices. Look for the consequences of their proposed land use plan. Be firm about the issues, but fair about this being a very difficult set of choices. Ask additional groups to volunteer to show their work in progress and discuss theirs similarly. . . Extension #1 Do the activity again up to step 6. After each interest group has presented its plan, form new groups with each of the new groups having a representative from each interest group. . .	• allow each student to defend their solution to the problem

Activity Title: LIVING RESEARCH : AQUATIC HEROES AND HEROINES — Activity Guide Page #: 160

Objective(s): Students will: describe the importance of the accomplishments of local people who have contributed to conserving or preserving aquatic environments.

Method/Overview: Students identify people through news media, current events or other means who have made contributions to conserving or preserving aquatic environments, research their contributions, including by interviewing them; and write a biography.

Subject Area(s): Social Studies, Language Arts — Grade Level(s): 7-12

Standards	**Performance Indicators (by grade clusters)**	**Evidence of alignment (text from activity description)**	**Notes to assure high alignment for every student**
Science and Technology L. Communication Students will communicate effectively in the application of science and technology.	Elementary Grades 3-4 1. Record results of experiments or activities (e.g., interviews, discussions, field work) and summarize and communicate what they have learned.	Procedure #4 Each team should develop a research plan. This should include the outline of any interviews they may want to conduct, whether with the person directly, or with others who know or knew them. . . Procedure #6 Once the interviews are complete, as well as any additional research, each team should write a biography about their person. . . .	• each student should participate in the research of their person

AQUATIC WILD Links/Science

Activity Title: TURTLE HURDLES			Activity Guide Page #: 164
Objective(s): Students will: describe the life cycle of sea turtles; 2) identify specific mortality factors related to sea turtles; 3) make inferences about the effects of limiting factors on sea turtle populations; and 4) make recommendations for ways to minimize the factors which contribute to the possible extinction of sea turtles.			
Method/Overview: Students become sea turtles and limiting factors in a highly active simulation game.			
Subject Area(s): Science, Social Studies, Math			Grade Level(s): 4-12
Standards	**Performance Indicators (by grade clusters)**	**Evidence of alignment (text from activity description)**	**Notes to assure high alignment for every student**
Science and Technology B. Ecology Students will understand how living things depend on one another and on non-living aspects of the environment.	Secondary Grades 3. Analyze the factors that affect population size (e.g., reproductive and survival rates).	Procedure #5 After completing this activity, encourage the students to discuss the results. It is likely that some students will be disturbed by the high mortality of the turtles and will benefit from the realization that there are groups actively trying to diminish human contributions to such high mortality. . . Extension #1 Change the ratio of predators and hazards to turtles and replay the simulation. Describe and discuss the differences. Evaluation #2 Name at least four limiting factors that prevent sea turtles from reaching the adult breeding stage.	• each student should participate in the discussion and answer the questions

AQUATIC WILD Links/Science

Activity Title: PLASTIC JELLYFISH			Activity Guide Page #: 170
Objective(s): Students will: 1) describe the potential effects of plastic waste on aquatic wildlife; and 2) identify specific actions they can take to help remedy the problem.			
Method/Overview: Students monitor the plastic waste production in their own households, research its effect on freshwater and marine life, and propose various ways to lessen the problem.			
Subject Area(s): Science, Social Studies			Grade Level(s): K-12
Standards	**Performance Indicators (by grade clusters)**	**Evidence of alignment (text from activity description)**	**Notes to assure high alignment for every student**
Science and Technology M. Implications of Science and Technology Students will understand the historical, social, economic, environmental, and ethical implications of science and technology.	Elementary Grades Pre-K-2 4. Demonstrate some practices for recycling and care of resources.	Procedure #4 Invite the students to survey their school grounds or community for plastic litter. Look to see if and where it exists. Investigate its potential negative impact on animals in the community. . . Procedure #5 Help the students put the plan into effect! Extension #2 Establish a litter patrol. Designate specific targets such as nearby beaches, lakes and stream beds. . . Extension #3 Write a plastic consumption conservation plan! Is plastic recycled in your home or community? If so, how? . . Evaluation #3 Write two things you can do to prevent harm to wildlife from plastic litter. . .	• each student should participate in the discussion and answer the questions

AQUATIC WILD Links/Science

Activity Title: WATERSHED			Activity Guide Page # 172
Objective(s): Students will: 1) describe the characteristics of watersheds; 2) discuss the role of watersheds in providing wildlife habitat as well as human habitats; and 3) give examples of how watersheds can be conserved and protected.			
Method/Overview: Students measure the area of a small watershed, calculate the amount of water it receives each year, and discuss the varied roles the watershed plays in human and wildlife habitat.			
Subject Area(s): Science, Math, Social Studies			Grade Level(s): 4-12
Standards	**Performance Indicators (by grade clusters)**	**Evidence of alignment (text from activity description)**	**Notes to assure high alignment for every student**
Science and Technology J. Inquiry and Problem Solving Students will apply inquiry and problem-solving approaches in science and technology.	Elementary Grades 3-4 1. Make accurate observations using appropriate tools and units of measure.	Procedure #5 As a group, have the students determine the location of the control stake at the "bottom" of the watershed. The control stake is the one from which measurements to the other stakes are made. The control stake should be 60 to 100 feet from the ridge stakes. Procedure #6 Once this is done, begin the measurements that will result in a map of the watershed. Each small team should draw a map of this miniature watershed. . .	• Each student should take their own measurements
	Middle Grades 5-8 1. Make accurate observations using appropriate tools and units of measure.	Procedure #5 Procedure #6	
	Secondary Grades 1. Make accurate observations using appropriate tools and units of measure.	Procedure #5 Procedure #6	

AQUATIC WILD Links/Science

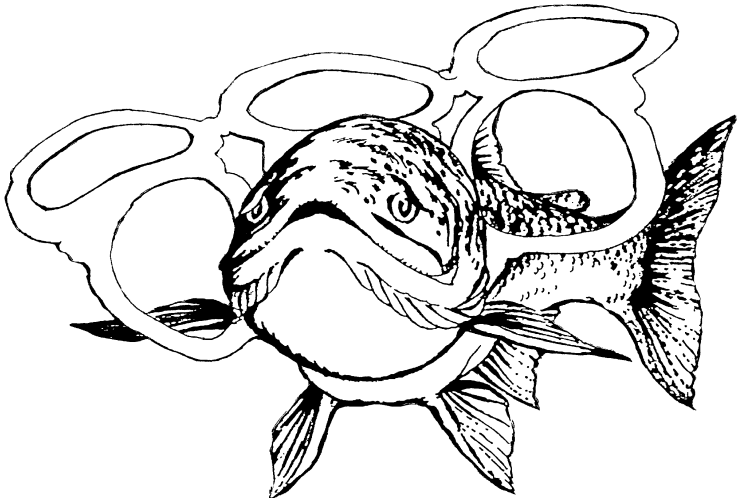
Activity Title: SOMETHING'S FISHY HERE! Activity Guide Page #: 176

Objective(s): Students will: 1) identify potential cause and effect relationships involving aquatic-related pollution; 2) examine their personal attitudes regarding aquatic pollution; 3) generate and evaluate alternative solutions to problems of aquatic pollution; and 4) outline a plan to initiate environmental action to reduce the negative consequences of aquatic pollution in their communities.

Method/Overview: Students read and discuss a story, inventing their own endings that lead to environmental action in their community.

Subject Area(s): Language Arts, Science, Social Studies Grade Level(s): 2-8

Standards	**Performance Indicators (by grade clusters)**	**Evidence of alignment (text from activity description)**	**Notes to assure high alignment for every student**
Science and Technology K. Scientific Reasoning Students will learn to formulate and justify ideas and to make informed decisions.	Elementary Grades Pre-K-2 4. Participate in brainstorming activities.	Procedure #6 Next have the students generate a list of possible aquatic wildlife problems related to aquatic pollution that they believe do exist in their own environment. Procedure #8 Once a specific issue is chosen, have the class list ten things that can be done to make that problem less damaging to aquatic wildlife.	• each student should generate their own lists



AQUATIC WILD Links/Science

Activity Title: ALICE IN WATERLAND			Activity Guide Page #: 182
Objective(s): Students will: 1) trace their domestic water to its source prior to human use and to its destination after use; 2) identify potential effects from human water use on terrestrial and aquatic wildlife; and 3) develop and practice responsible water conservation behaviors.			
Method/Overview: Students use a simulated field trip, lecture-discussion and student-gathered data to explore water use and its effects on wildlife habitat.			
Subject Area(s): Science, Math			Grade Level(s): 5-12
Standards	**Performance Indicators (by grade clusters)**	**Evidence of alignment (text from activity description)**	**Notes to assure high alignment for every student**
Science and Technology M. Implications of Science and Technology Students will understand the historical, social, economic, environmental, and ethical implications of science and technology.	Middle Grades 5-8 4. Describe an individual's biological and other impacts on an environmental system.	Procedure #2 Emphasize the places where wildlife habitats are affected – positively, negatively, or with unknown effect – by the intervention of people as they use the water or influence how the water is to be used. Procedure #5 Repeat the discussion and create a downstream mural. Include places where humans and wildlife are affected – positively, negatively, or with unknown effects – by the re-entry of this water into the hydrologic cycle. Procedure #6 Look at the entire mural – upstream and downstream. Identify, list and discuss places in which the quality of the water in the water cycle may be affected by human activities, not just the quantity of available water. Procedure #10 Once the results are tabulated, discuss how wildlife, habitat and humans can benefit from human water use conservation. Evaluation #3 Name three ways you might conserve water. How much water could you conserve using each method for a year? Evaluation #6 Give examples of ways that water quality can be affected negatively by human use. . .	• each student should participate in the discussion and answer the questions